



CLAIMS – APPLICATION NUMBER 09/970,356

What is claimed is:

1. An adaptive noise canceling microphone system comprising

a first microphone for generating a first microphone signal containing primarily speech and noise,

5 a second microphone for generating a second microphone signal containing primarily noise,

a first adaptive filter having a single filter coefficient, generating a first output signal from said first and second microphone signals,

a second adaptive filter having multiple filter coefficients, generating a second output signal from said first output signal and said second microphone signal,

10 wherein said first output signal is used to update said first adaptive filter and said second output signal is used to update said second adaptive filter, where said second output signal represents primarily speech.

2. A system as in claim 1 wherein the convergence parameter of said first adaptive filter is automatically set to zero after a fixed duration following inception of control so that adaptation of said first adaptive filter ceases to continue.

15 3. A system as in claim 1 wherein the convergence parameter of said second adaptive filter is automatically switched to zero from a non-zero constant when the said second output signal instantaneously exceeds a fixed, constant, threshold as determined by a comparator.

4. A system as in claim 1 wherein the convergence parameters of said adaptive filters are instantaneously compared to thresholds and updated according to the said first and second output signals.

20 5. A system as in claim 1 wherein said first microphone is directed toward the speaker's mouth and said second microphone is simultaneously directed away from the speaker's mouth.

6. An adaptive noise canceling microphone control method comprising

a first microphone for generating a first microphone signal containing primarily speech and noise,

a second microphone for generating a second microphone signal containing primarily noise,

25 a frequency domain adaptive controller generating a control output having a series of stored frequency domain threshold values and a frequency domain comparator, and

an error signal generated by subtracting said first microphone signal from said control output,

whereby the Fourier transform of said control output is compared to said frequency domain threshold values using said frequency domain comparator to generate a series of convergence parameters used to update the frequency domain adaptive controller.

5 7. A control method as in claim 6 wherein said series of stored frequency domain threshold values is manually entered and stored based on user desired threshold levels.

8. A control method as in claim 6 wherein said series of stored frequency domain threshold values is automatically determined by calculating the Fourier transform of said error signal during a moment in time when no speech is present in said first microphone signal and said Fourier transform of said error signal is  
10 stored as the threshold values.

9. A control method as in claim 6 wherein said comparator is implemented using software.

10. A control method as in claim 6 wherein said comparator is implement using hardware.

11. A system as in claim 6 wherein said first microphone is directed toward the speaker's mouth and said second microphone is simultaneously directed away from the speaker's mouth.

15 12. An adaptive noise canceling microphone control system comprising

a first microphone for generating a first microphone signal containing primarily speech and noise,

a second microphone for generating a second microphone signal containing primarily noise,

a first adaptive filter having a single filter coefficient, generating a first output signal from said first and second microphone signals,

20 a second frequency domain adaptive filter having multiple filter coefficients, a series of stored frequency domain threshold values, and a frequency domain comparator, generating a second output signal from said first output signal and said second microphone signal,

wherein said first output signal is used to update said first adaptive filter, and said second output signal is used to update said second adaptive filter, where said second output signal represents primarily speech.

13. A system as in claim 12 wherein the convergence parameter of said first adaptive filter is automatically set to zero after a fixed duration following inception of control so that adaptation of said first adaptive filter ceases to continue.

14. A control method as in claim 12 wherein said series of stored frequency domain threshold values is manually entered and stored based on user desired threshold levels.

15. A control method as in claim 12 wherein said series of stored frequency domain threshold values is automatically determined by calculating the Fourier transform of said error signal during a moment in time when no speech is present in said first microphone signal and said Fourier transform of said error signal is stored as the threshold values.

16. A control method as in claim 12 wherein said comparator is implemented using software.

17. A control method as in claim 12 wherein said comparator is implement using hardware.

18. A system as in claim 12 wherein said first microphone is directed toward the speaker's mouth and said second microphone is simultaneously directed away from the speaker's mouth.